

# PATENT ABSTRACTS OF JAPAN

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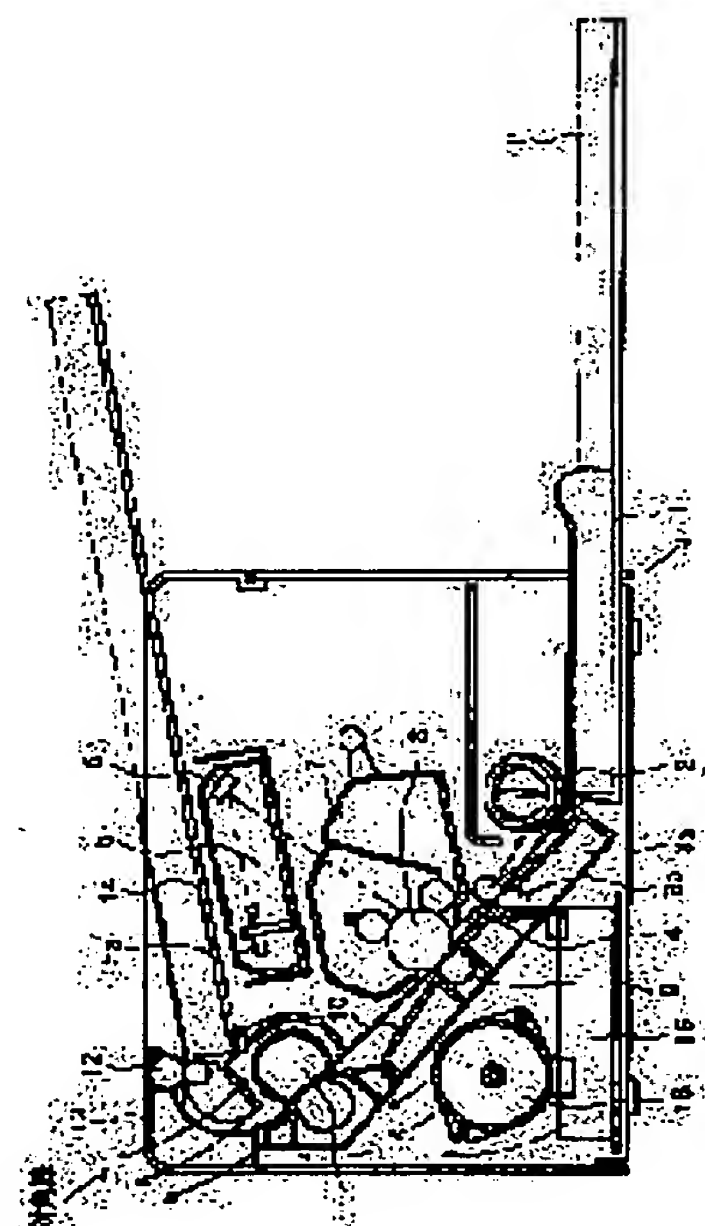
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## (54) IMAGE-FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image-forming device in small size which is quiet and furnished with the high image quality.

SOLUTION: This image-forming device is composed by forming recording material transporting route for transporting the recording material from a paper feeding roller 2 located on the bottom upwardly biased toward this device 11 located on the upper most part, and arranging a component-mounting part 15 below, and moreover, heat generating equipment for the part 15 is arranged on the device counter surface side.



## LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] An image formation means to develop with a developer the latent image formed in latent-image support of the image light from an image exposure means, An imprint means to imprint \*\*\*\*\* on said latent-image support to record material in the imprint section, A fixing means by which \*\*\*\*\* on the record material which passed through the imprint section is established, and the record material conveyance path of conveying the record material from a feed means to said fixing means through said imprint section, In the image formation equipment which has at least the electric equipment which consists of components of the electric system of equipment said record material conveyance path Image formation equipment characterized by having formed said fixing means toward the slanting upper part as the topmost part, having arranged said electric equipment under said record material conveyance path, and having arranged the exoergic components of said electric equipment to the equipment tooth-back side.

[Claim 2] An image formation means to develop with a developer the latent image formed in latent-image support of the image light from an image exposure means, An imprint means to imprint \*\*\*\*\* on said latent-image support to record material in the imprint section, A fixing means by which \*\*\*\*\* on the record material which passed through the imprint section is established, and the record material conveyance path of conveying the record material from a feed means to said fixing means through said imprint section, In the image formation equipment which has at least the electric equipment which consists of components of the electric system of equipment said record material conveyance path Said fixing means is formed toward the slanting upper part as the topmost part, said electric equipment is arranged under said record material conveyance path, and the exoergic components of said electric equipment are arranged to an equipment tooth-back side. In the upper part of said record material conveyance path Image formation equipment characterized by having arranged said image formation means and said image exposure means less than [ abbreviation homotopic or it ] in the vertical direction to said fixing means.

[Claim 3] Image formation equipment according to claim 1 or 2 characterized by the thing of an equipment base, an equipment tooth back, and said record material conveyance path side for which said electric equipment is arranged to any first page at least.

[Claim 4] Claim 1 characterized by carrying out intensive mounting of the primary flank article at an equipment tooth back thru/or image formation equipment of a publication of even either of 3.

[Claim 5] Claim 1 characterized by having arranged so that the abbreviation parallel of said record material conveyance path may be carried out to the diagonal line of the body of image formation equipment thru/or image formation equipment of any one publication of four.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention forms an image in a record medium, for example, relates to image formation equipments, such as an electrophotography copying machine, a printer word processor, and facsimile apparatus.

[0002]

[Description of the Prior Art] Although there are a laser beam printer, a copying machine, etc. which adopt an electrophotography method and other recording methods as image formation equipment, below, as an example of image formation equipment, a laser beam printer is mentioned as an example and explained.

[0003] An example of the conventional laser beam printer is explained using drawing 6.

[0004] The medium tray 1 as a feed means by which this laser beam printer loads two or more record material P, such as a record form, into a near side (left-hand side in drawing) the back side (drawing Nakamigi side) of the body of a printer, It is arranged at the inclination condition by which the paper output tray 14 as a delivery means to load the printed record material was located on the lengthwise direction. The laser scanner 5 as a process cartridge 7 and an exposure means has been arranged between a medium tray 1 and a paper output tray 14, and the fixing assembly 12 is further arranged to the left end side.

[0005] And the record material P to which paper was fed from the medium tray 1 with the feed roller 2 arranged near the lower limit of a medium tray 1 is conveyed with the conveyance rollers 3a and 3b to the imprint section by which the toner image of a photoconductor drum 8 is imprinted with the imprint roller 9, conveys the record material after an imprint to an anchorage device 11 further, and is delivered to a paper output tray 14 with the delivery roller 12 after fixing of a non-established toner image. 4 is a resist sensor, this synchronizes the luminescence timing of the laser scanner 5 which is the tip location and the exposure light source of the record material P, and an image draws it from the predetermined location on the record material P, and it carries out \*\*\*\*.

[0006] This printer has arranged the conveyance way which conveys the record material to which paper was fed from the feed roller 2 to an anchorage device 11 through the imprint section at an abbreviation horizontal, has arranged electric equipment 15 in the lower part of this level conveyance way, has arranged the process cartridge 7 in the upper part of the record material conveyance way of an abbreviation horizontal, and arranges the laser scanner 5 on it further.

[0007] Moreover, arrange a medium tray 1 to upper limit, and a paper output tray 14 is arranged [ in / both / the printer shown in drawing 7 ] at an abbreviation horizontal in a lower limit. The conveyance way has been arranged for the record material from the feed roller 2 to an anchorage device 11 through the imprint section to the abbreviation perpendicular, and electric equipment 15 is arranged along this perpendicular conveyance way to the printer near side (left-hand side in drawing) rather than this perpendicular conveyance way. Like illustration The anchorage device 11 has been arranged to the upper limit side of the body of a printer at the abbreviation perpendicular, and the laser scanner 5 as the process cartridge 7 and light source means as an image formation means is arranged on the side face of a vertical recording material conveyance way.

[0008]

[Problem(s) to be Solved by the Invention] However, since the laser scanner 5 as a process cartridge 7 or an exposure light source means was arranged in the upper part of the anchorage device 11 which is a source of generation of heat in the printer which has the record material conveyance way of an abbreviation horizontal



shown in drawing 6 , the toner in a process cartridge 7 might become hard according to a temperature up inside the plane, and the refractive index of the optical lens in a laser scanner 5 may change, and a good output image might not be obtained.

[0009] Moreover, since the turn with big conveyance path from the medium tray 1 as a feed means to the imprint roller 9 as an imprint means and imprint material conveyance path from the anchorage device 11 as a fixing means to the paper output tray 14 as a delivery means is needed, The sound on which the back end of imprint material bounds, and the sound against which imprint material rubs with a conveyance side were loud on the occasion of a turn, and the operation sound in the real busy condition of image formation equipment was large at it.

[0010] Moreover, the imprint material back end fell out from the medium tray 1 as a feed means, the vibration at the time of changing the course was transmitted to imprint material, and the fault that an image will be confused at the time of the toner image imprint to imprint material from the photoconductor drum 8 in the imprint roller 9 as an imprint means also had it.

[0011] Moreover, also in the case of the printer which has the vertical recording material conveyance way which conveys record material to the abbreviation perpendicular shown in drawing 7 , problems, such as a problem of an operation sound and image turbulence, were the same.

[0012] Moreover, since whenever [ setting-angle / of the laser scanner 5 as an exposure light source means ] became large further in this case, there was also fault to which the revolving shaft of polygon mirror 5a becomes near horizontally, the load concerning the bearing of the scanner motor which drives polygon mirror 5a becomes large, and the life of this scanner motor becomes it short "To delete a bearing and to be alike."

[0013] Then, in order to solve the above problems conventionally, the measures of enlarging size of the whole equipment, having kept away the anchorage device 11 which is a source of generation of heat from the laser scanner 5 as a process cartridge 7 or an exposure light source means, having made the rate of change of a conveyance path as small as possible, or carrying out arrangement of an exposure light source means to a layout near as horizontally as possible were taken. However, the rise of the enlargement and the manufacturing cost of equipment has been caused as a result of these cures.

[0014] The purpose of invention concerning this application is to offer the small image formation equipment [ that it is quiet and high definition ] which solves the above-mentioned trouble and does not have a temperature up inside the plane.

[0015]

[Means for Solving the Problem] The 1st configuration which realizes the purpose of invention concerning this application An image formation means to develop with a developer the latent image formed in latent-image support of the image light from an image exposure means, An imprint means to imprint \*\*\*\*\* on said latent-image support to record material in the imprint section, A fixing means by which \*\*\*\*\* on the record material which passed through the imprint section is established, and the record material conveyance path of conveying the record material from a feed means to said fixing means through said imprint section, In the image formation equipment which has at least the electric equipment which consists of components of the electric system of equipment said record material conveyance path It is characterized by having formed said fixing means toward the slanting upper part as the topmost part, having arranged said electric equipment under said record material conveyance path, and having arranged the exoergic components of said electric equipment to the equipment tooth-back side.

[0016] The 2nd configuration which realizes the purpose of invention concerning this application An image formation means to develop with a developer the latent image formed in latent-image support of the image light from an image exposure means, An imprint means to imprint \*\*\*\*\* on said latent-image support to record material in the imprint section, A fixing means by which \*\*\*\*\* on the record material which passed through the imprint section is established, and the record material conveyance path of conveying the record material from a feed means to said fixing means through said imprint section, In the image formation equipment which has at least the electric equipment which consists of components of the electric system of equipment said record material conveyance path Said fixing means is formed toward the slanting upper part as the topmost part, said electric equipment is arranged under said record material conveyance path, and the exoergic components of said electric equipment are arranged to an equipment tooth-back side. In the upper part of said record material conveyance path It is characterized by having arranged said image formation means and said image exposure

means less than [ abbreviation homotopic or it ] in the vertical direction to said fixing means.

[0017] The 3rd configuration which realizes the purpose of invention concerning this application is a configuration of one of the above, and is characterized by the thing of an equipment base, an equipment tooth back, and said record material conveyance path side for which said electric equipment is arranged at least at any first page.

[0018] The 4th configuration which realizes the purpose of invention concerning this application is a configuration of one of the above, and is characterized by carrying out intensive mounting of the primary flank article at an equipment tooth back.

[0019] The 5th configuration which realizes the purpose of invention concerning this application is a configuration of one of the above, and is characterized by having arranged so that the abbreviation parallel of said record material conveyance path may be carried out to the diagonal line of the body of image formation equipment.

[0020] With the above-mentioned configuration, since it is caudad arranged from the slanting conveyance path which electric equipment becomes from a feed means, an imprint means, and a fixing means, the tooth spaces from a feed means to a fixing means can increase in number, the space of the electric equipment upper part can be secured, and it can prevent that the heat which electric equipment generates according to the adiabatic efficiency by the air space has a bad influence on a light source means or an image formation means.

[0021] Moreover, it becomes possible by carrying out intensive arrangement of the exoergic components on electrical at an equipment tooth-back side to raise the exhaust air effectiveness to the tooth back of a body.

[0022]

[Embodiment of the Invention] (Gestalt of the 1st operation) The laser beam printer which is image formation equipment which adopts the electrophotography method which scans a laser beam to the photo conductor (photoconductor drum) as image support, and records the gestalt of operation of this invention on below is explained to an example.

[0023] Drawing 1 is the sectional view of the image formation equipment in which the gestalt of operation of the 1st of this invention is shown.

[0024] Among drawing, one is the sheet paper cassette which can be detached and attached freely to the body of image formation equipment, and the record material P is loaded in this sheet paper cassette 1. It is separated and fed with every one sheet of this record material P with the feed roller 2 arranged in the up front end side of a sheet paper cassette 1, and it is conveyed by the imprint section with the conveyance rollers 3a and 3b.

[0025] 4 is a resist sensor, this synchronizes the luminescence timing of the laser scanner 5 which is the tip location and the exposure light source of the record material P, and an image draws it from the predetermined location on the record material P, and it carries out \*\*\*\*. In addition, the laser scanner 5 as the exposure light source irradiates the photoconductor drum 8 which constitutes a process cartridge 7 through polygon mirror 5a which carries out high-speed rotation by the scanner motor whose laser which is not illustrated [ which is turned on and off according to image information ] is not illustrated, and the clinch mirror 6, and forms a latent image in a photoconductor drum 8.

[0026] In addition, the process cartridge 7 of the gestalt of this operation unifies image formation means, such as a cleaner which cleans the toner which remained the latent image on a photoconductor drum 8 and a photoconductor drum 8 on the photoconductor drum 8 after the development counter for forming \*\*\*\*\* (toner image) with a developer, and the imprint, and an electrification roller which electrifies that of a photoconductor drum 8 in uniform potential, and presupposes that it is exchangeable.

[0027] The imprint roller with which 9 makes \*\*\*\*\* on a photoconductor drum 8 imprint on the record material P, and 10 are conveyance guides which show even an anchorage device 11 to the record material P after an imprint, and an anchorage device 11 carries out heating fixing of the non-established \*\*\*\*\* on the record material P. And the record material P is discharged on the paper output tray 14 currently formed by the sheathing covering 13 and one with the delivery roller 12.

[0028] (record material conveyance include angle) As the image formation equipment of the gestalt of this operation is shown in drawing 1, the anchorage device 11 for carrying out heating fixing of the feed means which consists of a sheet paper cassette 1 and the feed roller 2, an imprint means to imprint \*\*\*\*\* on a photoconductor drum 8 with the imprint roller 9 on the record material P, and the toner image on the record material P is arranged toward the slanting upper part on about 1 straight line by making an anchorage device 11



into the topmost part.

[0029] After paper is fed to the record material P currently loaded into the sheet paper cassette 1 with the feed roller 2, the conveyance path of about 1 straight line is conveyed to the imprint section with the conveyance rollers 3a and 3b, and pinching conveyance is carried out after that even to an anchorage device 11 with a photoconductor drum 8 and the imprint roller 9 at an imprint and coincidence of a toner image.

[0030] It is stabilized, and it can convey the record material P, and can raise the dependability of record material conveyance while it can reduce the rubbing sound of the record material P in the case of record material conveyance, and the guide member which forms a record material conveyance path, since the conveyance path of the record material P in the meantime is an abbreviation straight line.

[0031] Moreover, since the anchorage device 11 is arranged at the topmost part of a record material conveyance path, even when a print activity is done continuously, the heat generated from an anchorage device 11 is discharged by the equipment exterior from the louver section which is not illustrated [ which was formed in the sheathing covering 13 ].

[0032] Moreover, a process cartridge 7 and the laser scanner 5 become possible [ obtaining an always good output image ], without being influenced of the heat generated from an anchorage device 11, since it is arranged the lower part [ anchorage device / 11 ] or horizontally.

[0033] Furthermore, by making the record material conveyance path of the gestalt of this operation parallel and mostly in agreement with the diagonal line of the case of image formation equipment, it became possible to arrange various devices effectively, and it also became possible to attain the miniaturization of equipment.

[0034] (laser scanner arrangement) As shown in drawing 1, the laser scanner 5 serves as arrangement upward slanting to the right from scanner polygon mirror 5a as unit arrangement, respectively. the record material conveyance path applied to a feed means - imprint means - fixing means as shown in drawing 1 in order to make magnitude of image formation equipment as small as possible here -- receiving -- abbreviation -- it is most effective to carry out incidence of the laser beam to a photoconductor drum 8 from a perpendicular direction. By considering as such a configuration, it becomes possible to store the depth and the height of image formation equipment in the minimum dimension.

[0035] In the configuration shown in drawing 1, the process cartridge 7 is removable from the tooth-back side of the body of equipment in the direction of a draw of a sheet paper cassette 1, can perform all of jam processing within image formation equipment, or exchange of a process cartridge 7 at an abbreviation horizontal from the same to it, and can improve usability.

[0036] In addition, about arrangement of a laser scanner 5, as shown in drawing 3, may make it arrange to the record material inclination conveyance path and abbreviation parallel covering a said feed means imprint section - fixing means, and, in this configuration, attachment and detachment of a process cartridge 7 will be performed from the upper part, but Since the laser scanner 5 can be kept away from an anchorage device 11, there is a merit which effect of the temperature up by the heat of an anchorage device 11 can be made hard to be influenced. of course, the record material conveyance path which applies the laser scanner 5 shown in drawing 3 to a feed means - imprint means - fixing means -- receiving -- abbreviation -- it is made to carry out incidence of the laser beam to a photoconductor drum 8 from the perpendicular direction.

[0037] as mentioned above, the record material conveyance path applied to a feed means - imprint means - fixing means -- receiving -- abbreviation -- if a setup of the laser beam incident angle of carrying out incidence of the laser beam to a photoconductor drum 8 is carried out to the configuration of the gestalt of this operation from the perpendicular direction, since a big degree of freedom will be given to arrangement of the laser scanner 7, it becomes easy to avoid the problem of usability or a temperature up.

[0038] (electrical system layout) the electric equipment 15 which consist of AC input, a low voltage power supply, a high voltage power supply, an actuator driver, ASIC, a fixing drive, and a sensor be show in drawing 1 -- as -- said feed means -- it arrange in the lower part of the record material conveyance path go to the slanting upper part apply to said fixing means, and be consider as the configuration which enlarge from said feed section, space apply it to said fixing section in electric equipment 15. By doing in this way, it becomes possible to secure the path of the air flow produced with the heat generated from electric equipment 15.

[0039] Moreover, the heat generated from the anchorage device 11 arranged in the electric equipment 15 upper part will be discharged by the equipment exterior from the louver section (un-illustrating) prepared in the sheathing covering 13. It becomes possible in that case to also make this part generate the air flow by exhaust

heat of an anchorage device 11 by preparing space between the rear face (record material discharge side) of an anchorage device 11, and the sheathing covering 13.

[0040] Therefore, by preparing the big space as mentioned above in the lower part of an anchorage device 11, and arranging electric equipment 15, and establishing space in the rear-face side of an anchorage device 11, even if there is no FAN for cooling etc., it becomes possible from electric equipment 15 to generate the air flow for the exhaust heat applied to an anchorage device 11, and \*\*\*\* inside image formation equipment also cancels \*\*, and is effective in the ability to prevent a temperature up.

[0041] The detail of mounting arrangement of electric equipment 15 is shown in drawing 4. Drawing 4 is drawing which looked at electric equipment 15 from the top, the method of drawing Nakagami is a tooth-back side of a body, and a lower part is a transverse-plane side of a body. An inlet (input terminal section) and Power SW (electric power switch) are arranged to the method of the right rear, AC input section is constituted, and a low voltage power supply section is constituted in the center of back. Thereby, as for the heat of a low voltage power supply section, exhaust air becomes easy from the tooth back of a body.

[0042] Moreover, in order to prepare the contact for a developer and electrification equipment in the back left of a body, a high-tension circuit is arranged.

[0043] Moreover, the components of the COMS system centering on ASIC not generating heat are mounted in front left-hand side, and it is made to constitute I/F with Formatter in left-hand side.

[0044] Moreover, in front right-hand side, the high-tension circuit which generates the imprint electrical potential difference to an imprint roller is arranged.

[0045] Since the sound generated from FAN is lost as well as the ability to attain a cost cut when the configuration of FAN loess (fan loess) is attained by this, it also becomes possible to offer quiet image formation equipment.

[0046] That is, it becomes possible to raise the exhaust air effectiveness to the tooth back of a body by carrying out intensive arrangement of the exoergic components which are primary flank articles on electrical at an equipment tooth-back side.

[0047] (arrangement of a driving source) As shown in drawing 1 and drawing 2, the motor 16 as a driving source is directly mounted on the conductive side attachment wall 20 which is a part of frame of image formation equipment, and is arranged at the lower part of a record material conveyance path.

[0048] In case it corresponds to improvement in the speed of image formation equipment by arranging the motor 16 as a driving source in the lower part of a record material conveyance path, it becomes possible to correspond flexibly also to enlargement of a motor, modification to a DC motor from a stepping motor, etc. This enables it to attain easily the improvement in the speed to 10 ppm to 20 ppm.

[0049] Moreover, while becoming possible to miss easily the heat which motor confidence generates by mounting a motor on the conductive frame of image formation equipment directly to a frame and becoming possible to raise a motor efficiency, it also becomes possible [ it being easy, being total and cutting down the cost ] to take a ground.

[0050] Moreover, a motor 16 and the electric equipment 15 are arranged [ both ] in the lower part of a record material conveyance path, and an air flow is generated by preparing feather on a motor shaft, and it becomes possible to perform exhaust heat actuation of electric equipment 15 more efficiently.

[0051] (frame structure) As shown in drawing 2, the frame structure of the gestalt of this operation holds the conductive scanner plate 23 and electric equipment 15 holding the conveyance plate 22 which consists of resin holding the side attachment walls 20 and 21 of one pair of conductive right and left, a feed means, a conveyance means, an imprint means, and a fixing means, and the laser scanner 5 as a light source means, and consists of a conductive bottom plate 24 arranged at the image formation equipment bottom.

[0052] The conductive ingredient is suitable from a viewpoint of rigidity, an electric ground, and electromagnetic wave shielding, and the right-and-left side attachment walls 20 and 21 consist of sheet metals. The motor 16 which is a driving source as mentioned above is directly mounted on the left-hand side wall 20, and the big merit is obtained from the ease of heat dissipation, oscillating reduction, and electric ground connection.

[0053] Since the conveyance plate 22 which has the interior of a proposal of the part and the record material P holding main units, such as a feed means, a conveyance means, an imprint means, and a fixing means, has the merit that the cost cut by using a complicated configuration as one component and the heat dissipation from

electric equipment can be insulated, the one mold goods in a resin ingredient are used.

[0054] The scanner plate 23 needs to be high rigidity in order to reduce vibration produced by rotation of polygon mirror 5a, and the sheet-metal ingredient is used for it.

[0055] Moreover, the bottom plate 24 arranged at the equipment bottom uses the sheet-metal ingredient from the property of electromagnetic wave shielding called for in order to hold the rigidity as a part of structure, and electric equipment.

[0056] It is effective in the ability to attain low cost, satisfying the function of heat insulation, quantity rigidity and heat dissipation / oscillating reduction by considering as the above frame structures.

[0057] (Gestalt of the 2nd operation) Drawing 5 shows the gestalt of the 2nd operation.

[0058] The gestalt of operation of \*\*\*\* 2 like the modification of the gestalt of the 1st operation shown in drawing 3 The laser scanner 5 as an exposure optical means is arranged to the inclined record material conveyance path applied to a feed means - imprint means - fixing means, and abbreviation parallel. By changing the include angle of a medium tray (sheet paper cassette) 1 and a paper output tray 14 (it being an abbreviation right angle to said inclination conveyance path), various configurations are possible according to the purposes, such as making it easy to be visible in the recording paper to which made the footprint small or paper was delivered. In addition, it is possible to make it easy to be visible in the recording paper to which both the sheet paper cassette 1 and the paper output tray 14 inclined rather than the level condition, and made the footprint small or paper was delivered also in the case of the gestalt of operation of drawing 3 .

[0059] It cannot be overemphasized that the effectiveness acquired by, of course performing conveyance of record material toward the slanting upper part to a feed means - imprint means - fixing means also by this case is equivalent.

[0060]

[Effect of the Invention] The path of the air flow produced with the heat generated from electric equipment is secured by according to this invention, arranging in the lower part of the record material conveyance path go to the slanting upper part which applies the electric equipment which consists of AC input, a low voltage power supply, a high voltage power supply, an actuator driver, and ASIC to a feed means - fixing means, and considering as the configuration which enlarges from the feed section, space applying it to the fixing section in electric equipment, as explained above.

[0061] Moreover, exhaust air effectiveness improves sharply by carrying out intensive arrangement of AC input and the low voltage power supply at the tooth back of a body, for example, it is speedup correspondence of a body etc., and even if a power supply increases, it can plan on a function and \*\*\*\*\* easily, without carrying out an addition of a fan and making a large change of a body configuration.

[0062] Furthermore, it is effective in the ability to miniaturize the magnitude of image formation equipment by arranging the record material conveyance path to a feed means - imprint means - fixing means on abbreviation parallel lines to the diagonal line of image formation equipment.

[0063] Since the image formation means and the image exposure means are arranged to the fixing means in width or the bottom, an image formation means and an image exposure means stop moreover, influencing by the heat of a fixing means.

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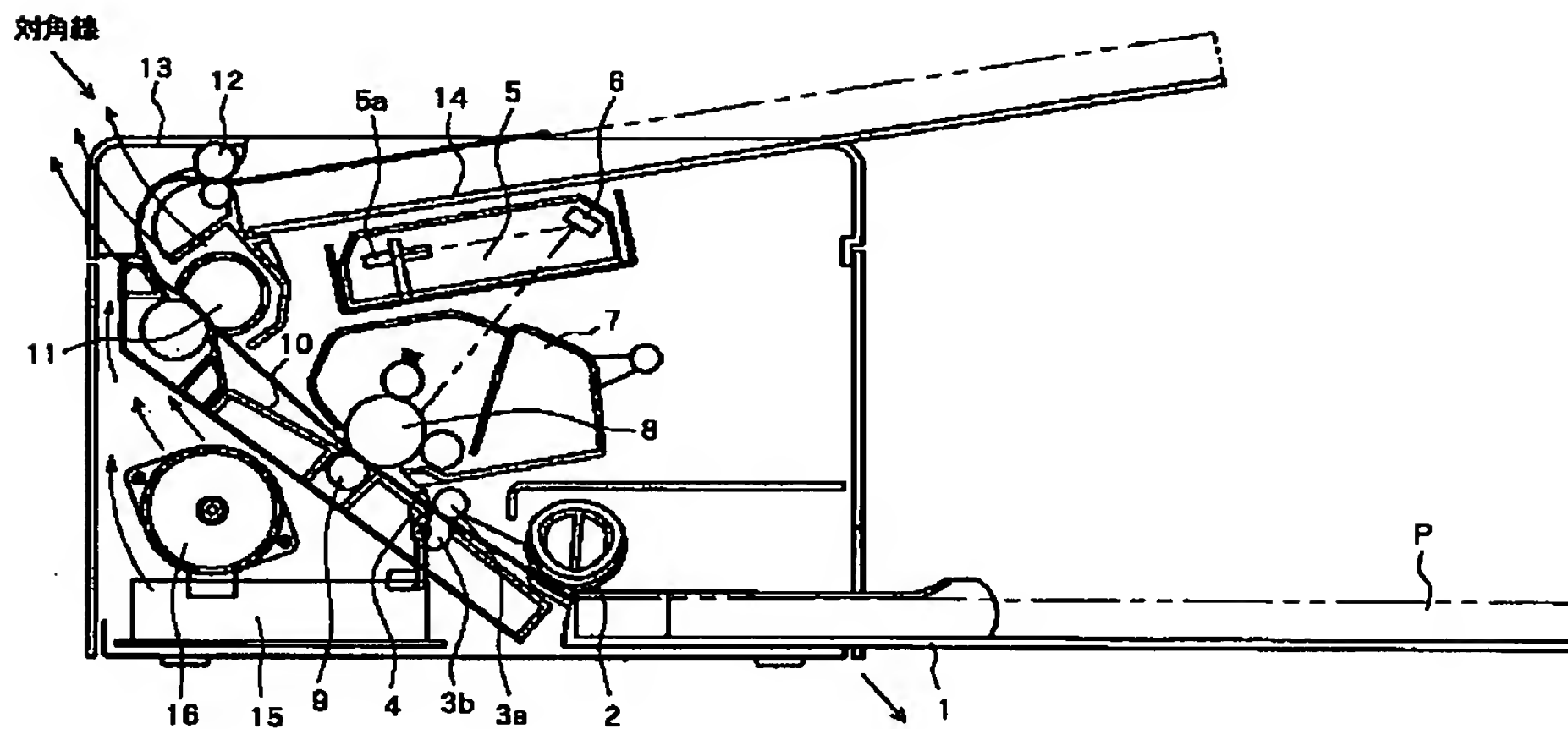
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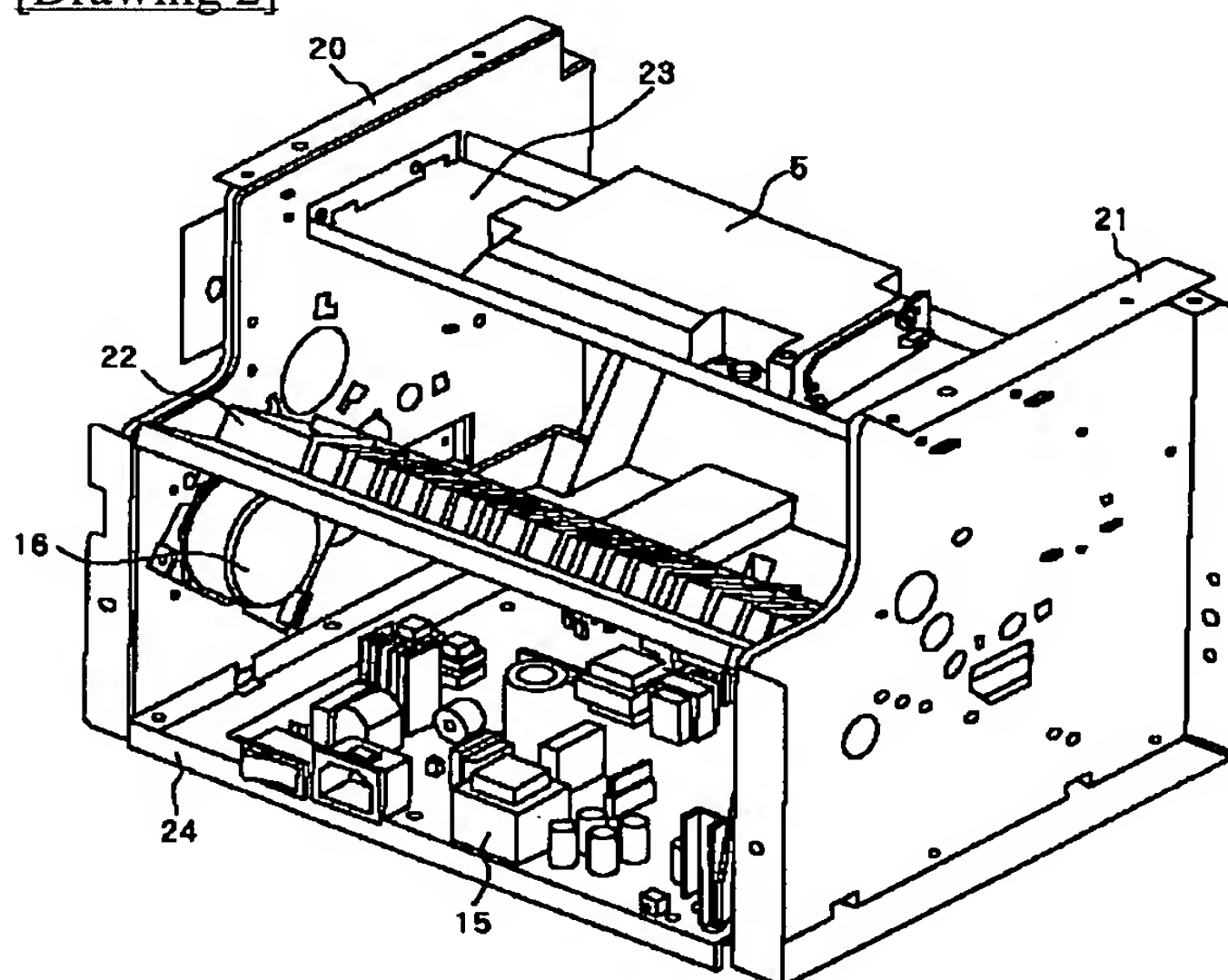
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## DRAWINGS

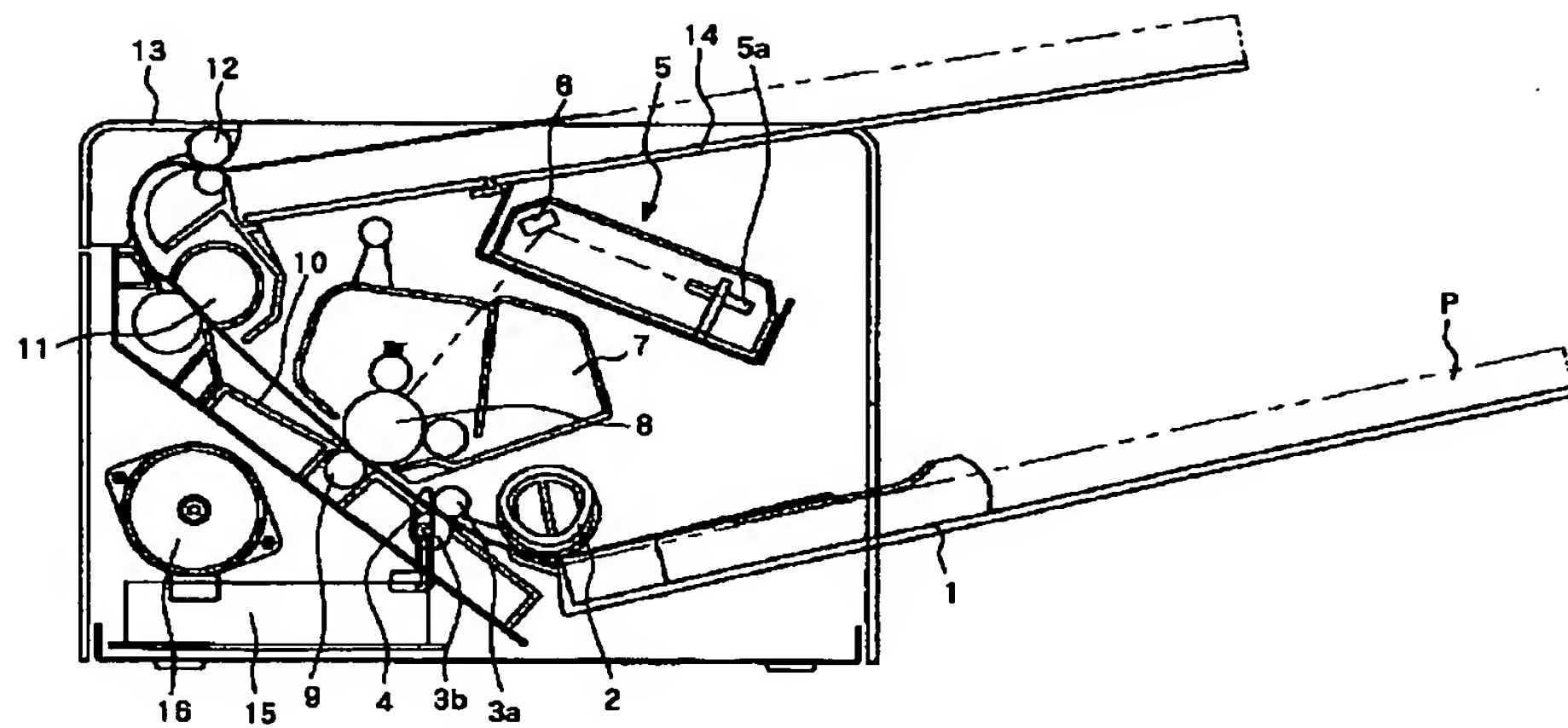
[Drawing 1]



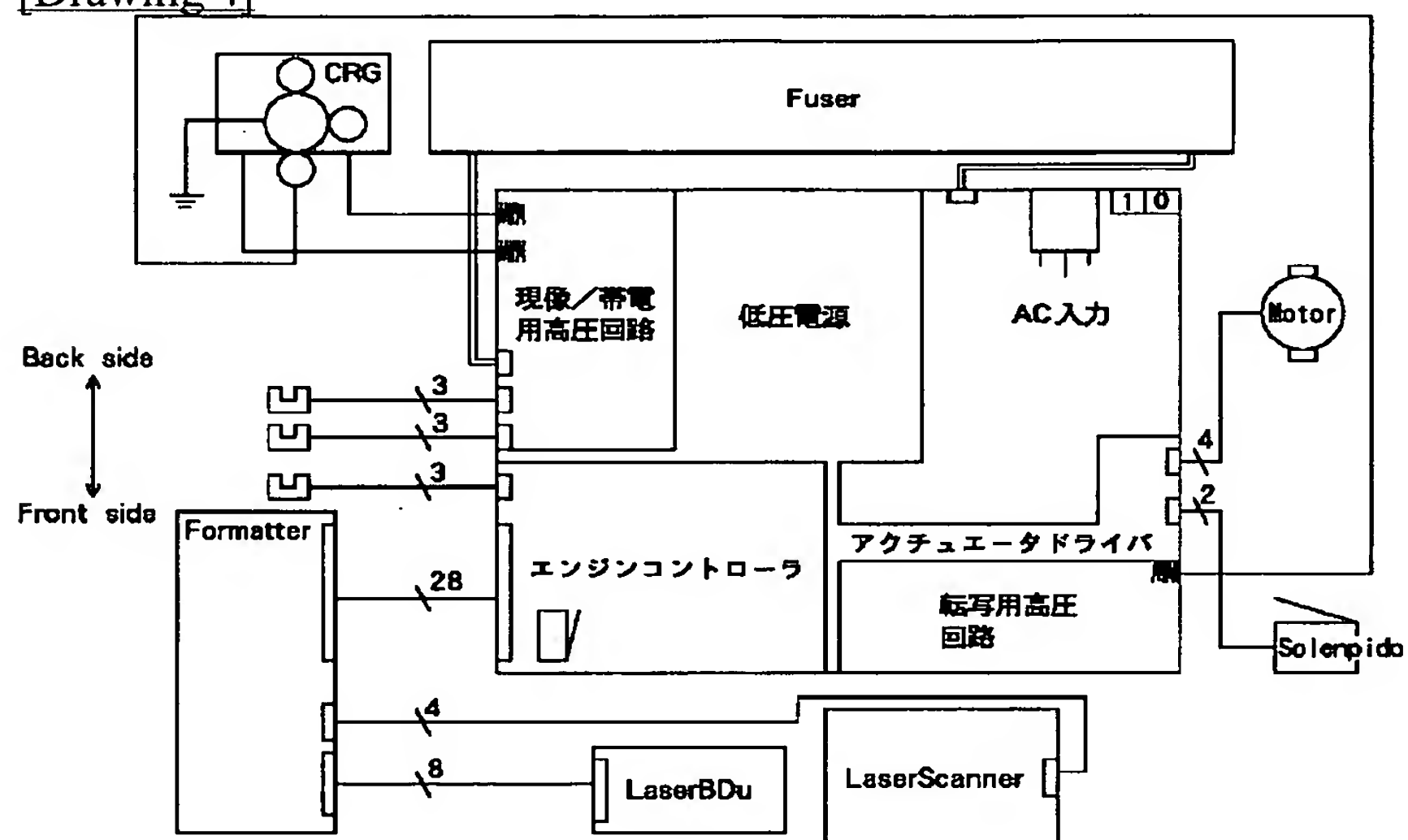
[Drawing 2]



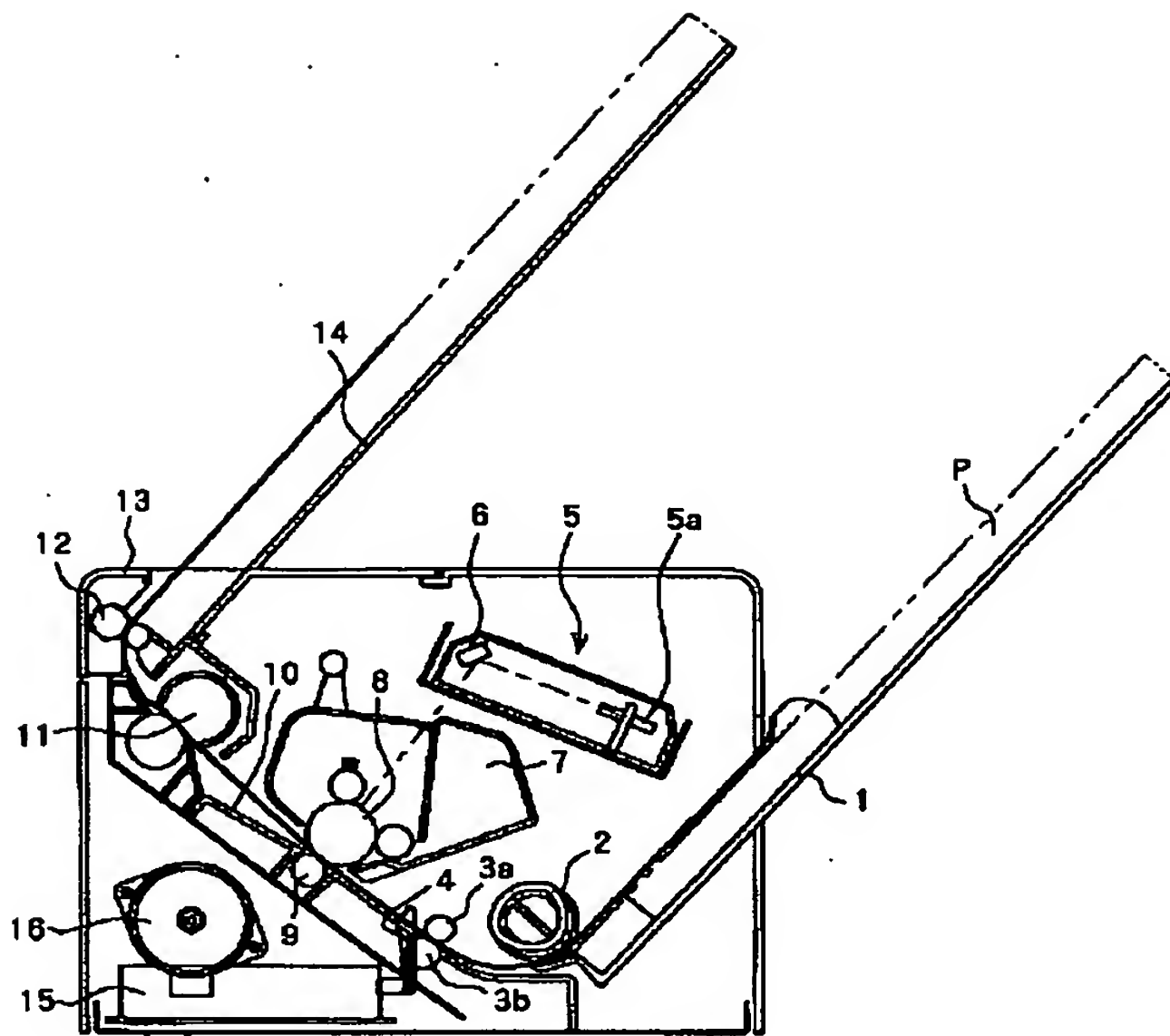
[Drawing 3]



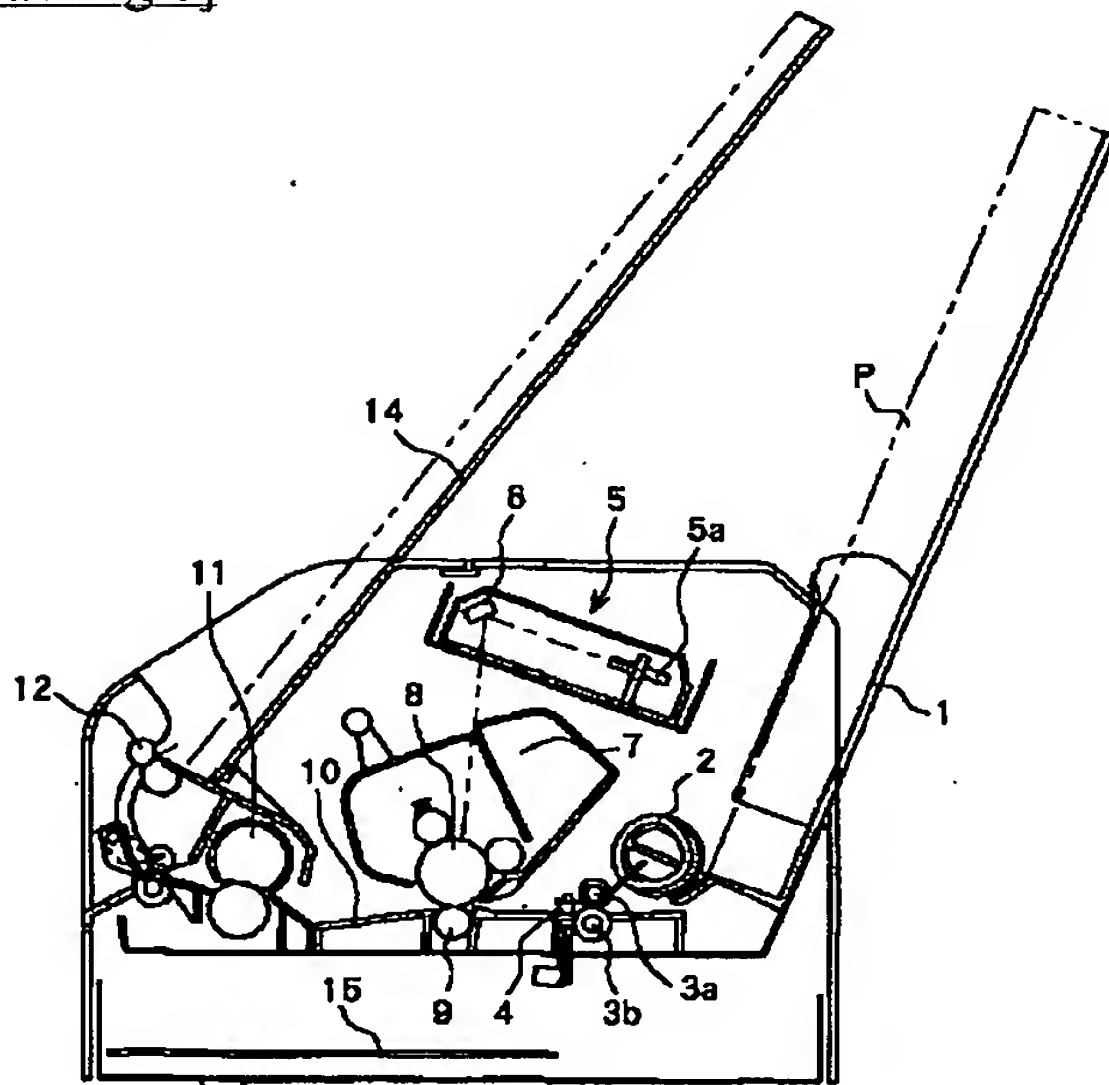
[Drawing 4]



[Drawing 5]

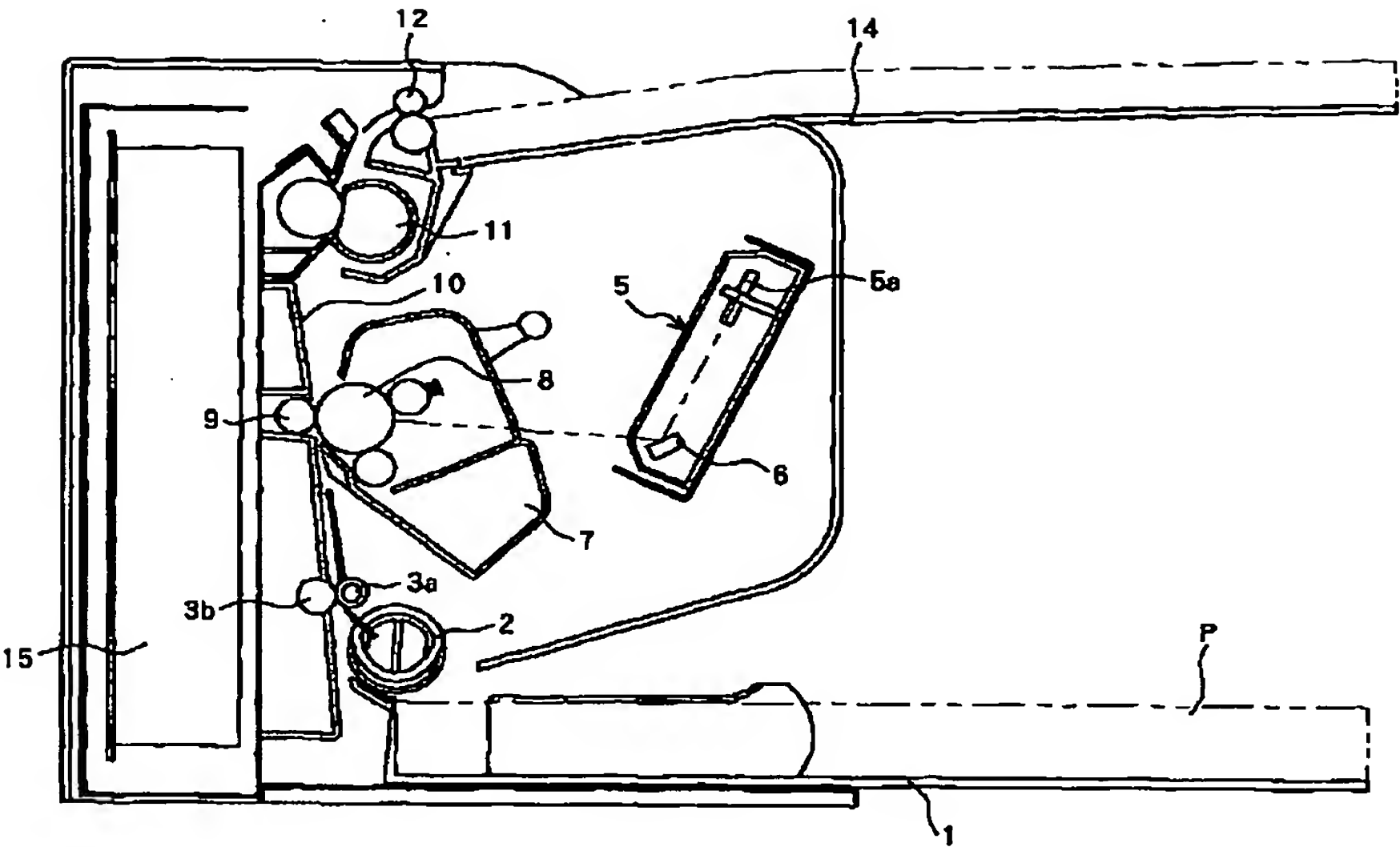


[Drawing 6]



[Drawing 7]





[Translation done.]